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(54) MILLED DETERGENT BARS STRIPED IN A CONTROLLED PATTERN

(71) We, PROCTER & GAMBLE LIMITED, a British Company of Hedley House, Gosforth, Newcastle-upon-Tyne, NE99 1EE, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a process for making milled soap, e.g. toilet soap, or synthetic-detergent bars, having stripes of at least one distinctive colour.

A Duplex plodder ("Duplex" is a registered trade mark) is conventionally employed in making milled toilet soaps. In a conventional process for making milled soap bars, soap of substantially the final composition in particulate form, such a chips, noodles, or the like, is fed into the hopper of a first plodder which forces the soap through a perforated plate known as the noodle plate. The extruded soap as it issues from the openings of the noodle plate is cut into short lengths (noodles) by a rotating knife and falls into an evacuated chamber (the "vacuum chamber"), which also constitutes the feed hopper to a final plodder. This forces the soap through a perforated plate, known as the pressure plate, into a tapering section, known as the nose cone, having a shaped outlet, known as the nozzle, whence a compacted bar of soap, of cross-section defined by the shape of said nozzle, is extruded. This bar can be cut into suitable lengths for stamping.

The "long" axis of the soap bar, before or after cutting, is that aligned with the axis of the final plodder and the direction of extrusion of the soap bar. Normally the "long" axis of the cut tablets is their longest dimension, but it need not be so.

Various methods of manufacturing colour-striped milled soap bars have been described; in particular, Netherlands Patent Application 68.07641, as open to public inspection, describes a process wherein the extrusion cone, i.e. the nose cone, is provided with an injection device by which coloured material is injected into the soap mass. Depending on the location of the injection nozzle, the continuous soap bar leaving the nose cone may be coloured at various points over its cross-section. The specification and the relevant drawing, Figure 3 thereof, give no teaching as to how the injection nozzles are arranged and supported within the nose cone of the plodder.

The present invention provides a process for the manufacture of milled soap or synthetic detergent bars having stripes (which term herein includes streaks and the like) of at least one distinctive colour that are arranged in a uniform pattern over the cross-section of the bars, which process comprises forcing soap or detergent through a pressure plate, located in a plodder, into a chamber tapering from the plate to an extrusion nozzle, and injecting a liquid solution or dispersion of colouring matter into the soap or detergent through at least one injection nozzle located in a predetermined position in the chamber such that the upstream-facing end of the injection nozzle is downstream of the region of eddy currents formed in the soap or detergent by its passage through the pressure plate, the or each injection nozzle having supporting means attaching it to the pressure plate and means supplying it with a solution or dispersion of colouring matter from a supply location within the pressure plate, the or each injection nozzle being formed with an abrupt increase in cross-sectional area in the direction of flow so as to prevent back-flow of the colouring matter into the soap or detergent passing across the injection nozzle upstream of the injection-nozzle outlet.

Two or more of such injection nozzles may be arranged in a chosen spatial relationship across the cross-section of the tapering chamber (or nose cone).

Advantageously, a single length of pipe connected to the pressure plate is employed to support each nozzle and to supply it with colouring matter. Generally, such a

pipe is axially aligned with the flow lines of the soap or detergent; this minimizes both stress on the pipe and disturbance of the flow through the tapering chamber.

The region of static pressure upstream of each injection-nozzle outlet must be high enough to prevent the solution or dispersion of colouring matter flowing counter to the direction of flow of the soap or detergent. This local higher static pressure is achieved by ensuring that the injection-nozzle unit has a cross-sectional diameter that is appreciably greater than that of the pipe that supports it and supplies it with colouring matter. Furthermore, the upstream facing portion of the injection nozzle should be so shaped as to generate a region of high static pressure in the soap or detergent flowing across it. Thus, the upstream-facing surface is shaped to provide an abrupt increase in cross-sectional area in the direction of flow.

Preferably, the cross-sectional diameter of each injection-nozzle unit is at least twice that of the supporting supply pipe and the upstream facing surface is substantially at right-angles to the flow lines, with a sharp defining edge.

The solution or dispersion of colouring matter will usually (but not necessarily) be aqueous.

The invention will now be described with reference to the drawings accompanying the provisional specification, in which

Figure 1 is a longitudinal section of an exemplary Duplex plodder, shown schematically, suitable for use in this invention,

Figure 2 is a section through the final portion, including the pressure plate and nose cone, of the apparatus of Figure 1,

Figure 3 is a plan of a suitable pressure plate for use in this invention,

Figure 4 is a plan of an alternative form of pressure plate, and

Figure 5 is a plan of yet another form of pressure plate.

The invention, as stated above, is applicable to the manufacture of soap, soap-synthetic and synthetic-detergent bars, but for convenience will now be described in this Specification in terms of soap bars.

The apparatus comprises, as shown in Figure 1, a hopper 1 through which the soap in particulate form is fed to a first plodder 2 comprising a worm or scroll 2a. The soap is forced through a perforated noodle plate 3; the soap issuing from the openings of the noodle plate 3 is cut into short lengths (noodles) by a rotating knife (not shown), which lengths fall into a vacuum chamber 4. The soap is conveyed through a final plodder 5 having a worm or scroll 5a, forced through a pressure plate 6 into a tapering chamber, or nose cone, 7 wherein colouring matter is injected into a proportion of the soap. The soap is then extruded through an extrusion nozzle 8 in the nose cone 7 as a bar 9. The bar 9 is then cut into desired lengths 10.

A preferred means of carrying out the invention is shown diagrammatically in Figure 2.

Soap is caused to flow through the final plodder 5 by means of the indicated scroll 5a, and through a pressure plate 6, which is preferably made of stainless steel and is usually 1 inch to 2 inches thick so as to be strong enough to withstand the extrusion pressures in the nose cone. This plate may have many small apertures or fewer larger apertures or may even consist of a spoked plate (or "spider"), as shown schematically in Figures 3, 4 and 5 respectively. In any case, one or more conduits 17 must be provided to respective openings 11 in the pressure-plate structure, into each of which is fixed, on the downstream side, a pipe 12 carrying an injection-nozzle device 13.

The length of the pipe 12 should be such that the back (upstream-facing) part of the injection-nozzle device is beyond the area of eddy formation in the moving soap mass. Thus the distance "D" (Figure 2) should preferably be at least about twice the distance "d" (Figures 2, 3, 4 and 5). The distance "d", being that between the apertures 16 in a perforated pressure plate, or being the breadth of spokes in a spoked plate, is herein defined as the width of the imperforate regions in the pressure plate 6 which obstruct flow.

The position of the injection nozzles 13 with respect to the cross-section of the nose cone 7 can be selected by the location of the openings 11. Preferably, in view of the considerable pressure in the soap mass, the injection nozzles 13 and the supply pipes 12 are aligned with the flow lines of the soap downstream of the point of attachment to the pressure plate.

Preferably, a perforated plate or mesh 15, suitably supported, is provided at a point downstream of the colour-injection nozzles 13. This must be strongly made and attached, so as to resist the pressure of the flowing soap mass. It serves to induce a degree, controllable by the size and number of the apertures in it, of mixing of the coloured soap into the body of the uncoloured soap, and thus of controlling the definition of the coloured stripes in the bars. (The expression "uncoloured soap' as used above refers to the soap that retains the colour, i.e. the base colour (which may, for example, be white or some other pale colour), it had when fed into the plodder. Colouring matter of two or more distinctive colours (which includes distinctive shades of colour), with respect to the base colour, may be fed to respective openings 11 in the

pressure plate 6 in order to obtain different colours of stripes in the product).

The supply of colour solution or dispersion to the conduits 10, and thus to the injection nozzles 13, may be arranged in any convenient way. Preferably the solution or dispersion is pumped by means of a metering pump, whose output can be automatically related to the throughput of soap, at a pressure greater than that of the soap in the nose cone. The pump must therefore be capable of delivering the colour solution at a pressure in the range 5 to 50 atmospheres.

If desired, the colour solution or dispersion may contain other components, for instance thickeners or dispensing agents, affecting the properties of the dispersion, and/or components, such as bactericides, affecting primarily the properties of the finished soap.

It is desirable to incorporate a non-return valve, for example a spring-loaded valve, in the injection nozzles 13 so that soap cannot be forced back into the colour solution channels. Preferably the outlet 14 of the injection nozzle 13 comprises a diffusing device such as a perforated or sintered tip or end-cap, e.g. a sintered metal end-cap, or a mesh.

If desired, the mass of soap in the nose cone 7 and nozzle 8 thereof may be given a rotational motion, for instance by suitable vanes (not shown) fixed in the nose cone, and thereby the stripes can be given a spiral alignment centred on the long axis of the bar. Where no such rotational motion is induced, the colour stripes will generally be longitudinally aligned along the extruded bar.

In come cases, the outer layers of the bar of soap 9 extruded from the plodder may have received undue mixing due to frictional drag in the nose cone 7, and the striping may be rendered indistinct. In such cases, apparatus can be provided to skim a layer, for instance about one millimetre thick, from the surface of the extruded soap.

EXAMPLE

White base soap having the composition shown below was extruded in a vacuum plodder in accordance with the invention:

81.5% by weight of anhydrous soap
6.8% of free fatty acid
10.2% of water
1.0% of perfume
0.1% of titanium dioxide
0.4% of salt

A green coloured dispersion was injected into the base soap at eight injection points in the nose cone of the final plodder at the rate of 3 ml per pound of soap. The resulting soap bars showed the required striped effects.

Similar striped effects were obtained when the base soap had a non-white colour which was contrastingly coloured to the injected dye dispersion; when the base soap was derived from transparent stock; and when the injected solution contained ingredients, such as bactericides, other than colouring matter.

WHAT WE CLAIM IS:—

1. A process for the manufacture of milled soap or synthetic detergent bars having stripes of at least one distinctive colour that are arranged in a uniform pattern over the cross-section of the bars, which process comprises facing soap or detergent through a pressure plate, located in a plodder, into a chamber tapering from the plate to an extrusion nozzle, and injecting a liquid solution or dispersion of colouring matter into the soap or detergent through at least one injection nozzle located in a predetermined position in the chamber such that the upstream-facing end of the injection nozzle is downstream of the region of eddy currents formed in the soap or detergent by its passage through the pressure plate, the or each injection nozzle having supporting means attaching it to the pressure plate and means supplying it with a solution or dispersion of colouring matter from a supply location within the pressure plate, the or each injection nozzle being formed with an abrupt increase in cross-sectional area in the direction of flow so as to prevent back-flow of the colouring matter into the soap or detergent passing across the injection nozzle upstream of the injection-nozzle outlet.

2. A process according to claim 1, wherein the upstream-facing end of the or each injection nozzle is at a distance from the pressure plate equal to at least twice the width of the imperforate regions in the pressure plate to the flow of soap.

3. A process according to claim 1 or 2, wherein the or each injection nozzle is attached to the plate by a single supply pipe.

4. A process according to claim 3, wherein the supply pipe is aligned with the flow lines of the soap or detergent.

5. A process according to claim 3 or 4, wherein the cross-sectional diameter of the or each injection nozzle is at least twice the cross-sectional diameter of its respective supply pipe.

6. A process according to any of claims 1 to 5, wherein the upstream-facing end of the or each injection nozzle is substantially at right-angles to the flow lines of the soap or detergent.

7. A process according to any of claims 1 to 6, wherein the or each injection nozzle comprises a non-return valve.

8. A process according to any of claims 1 to 7, wherein the or each injection nozzle comprises a diffusing device.

9. A process according to claim 8, wherein the diffusing device comprises a mesh or a sintered-metal end-cap.

10. A process according to any of claims 1 to 9, wherein a perforated plate or a mesh is set across the cross-section of the tapered chamber downstream of the injection nozzle or nozzles.

11. A process according to any of claims 1 to 10, wherein the rate of supply of colouring matter is proportioned to the throughput of soap or detergent.

12. A process according to any of claims 1 to 11, wherein the colouring matter is in aqueous solution or dispersion.

13. A process according to any of claims 1 to 12, wherein the colouring-matter solution or dispersion contains one or more further functional ingredients.

14. A process for the manufacture of milled soap or synthetic-detergent bars having stripes of at least one distinctive colour, which process is substantially as hereinbefore described with reference to the drawings accompanying the provisional specification.

15. Apparatus for the manufacture of milled soap or synthetic-detergent bars having stripes of at least one distinctive colour, which apparatus comprises a plodder communicating with a chamber via a pressure plate, the said chamber tapering from the pressure plate to an extrusion nozzle, and at least one injection nozzle within the said chamber, the nozzle being attached to and spaced from the said pressure plate by a supply pipe adapted to supply the injection nozzle with a colouring-matter dispersion or solution from a location within the pressure plate, the upstream-facing end of the nozzle being at a distance from the apertured plate equal to at least twice the width of the imperforate regions in the pressure plate, and the cross-sectional diameter of the nozzle being at least twice that of the supporting supply pipe.

16. Apparatus according to claim 15, substantially as hereinbefore described with reference to the drawings accompanying the provisional specification.

17. Milled, striped soap or synthetic-detergent bars, whenever made by a process according to any of claims 1 to 14 or in apparatus according to claim 15 or 16.

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1437323 PROVISIONAL SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

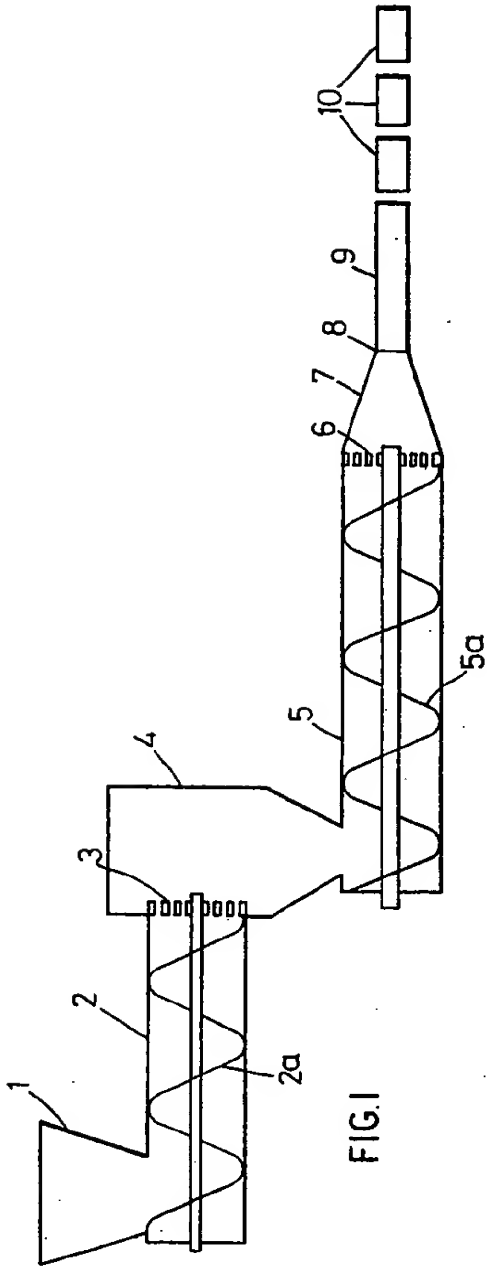


FIG.1

1437323 PROVISIONAL SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

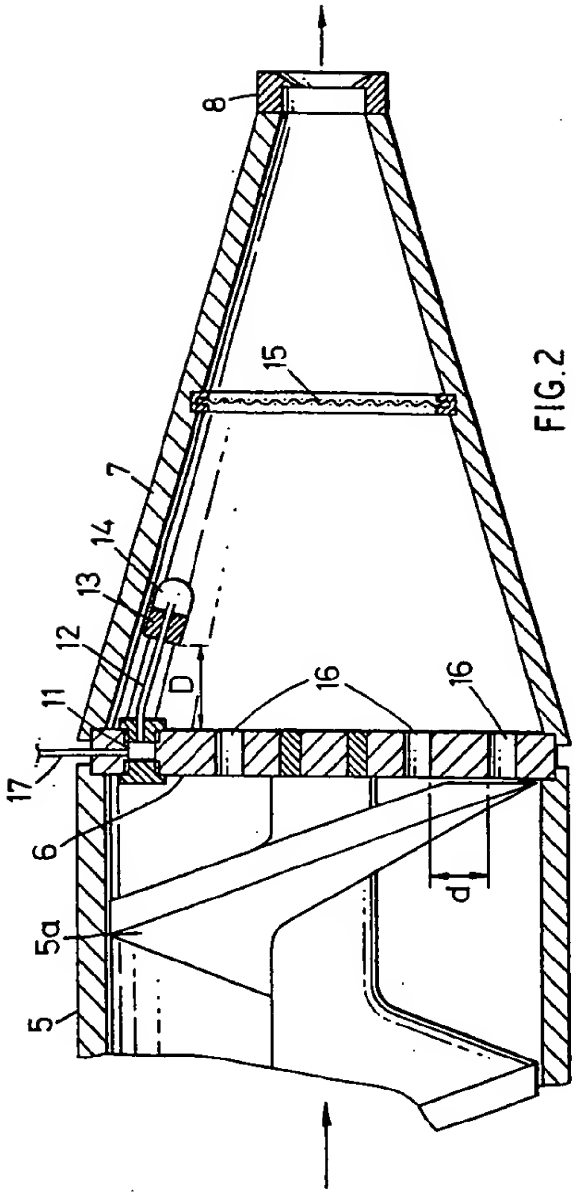
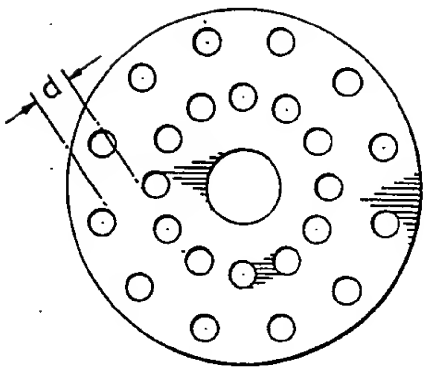


FIG.2

FIG.3



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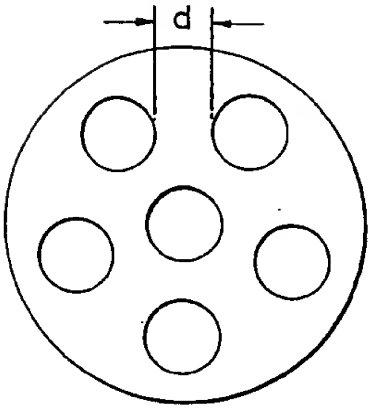

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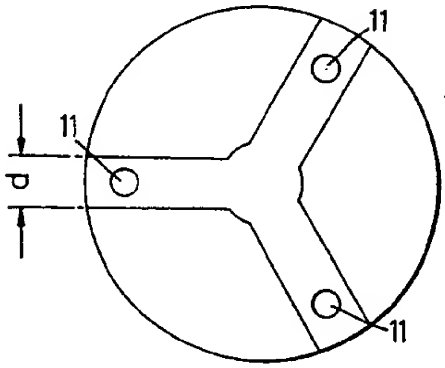

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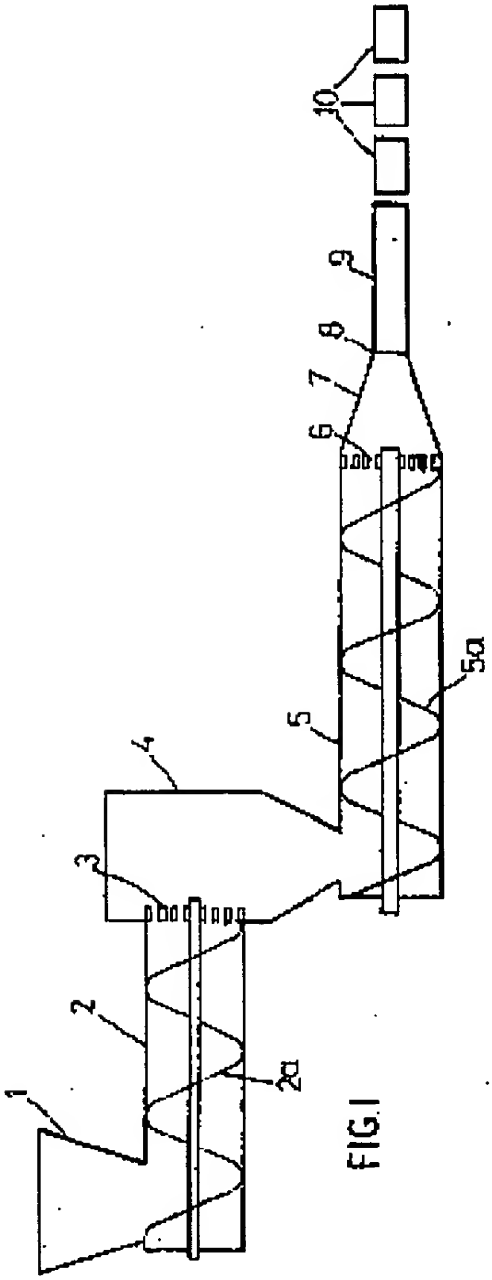

FIG.1

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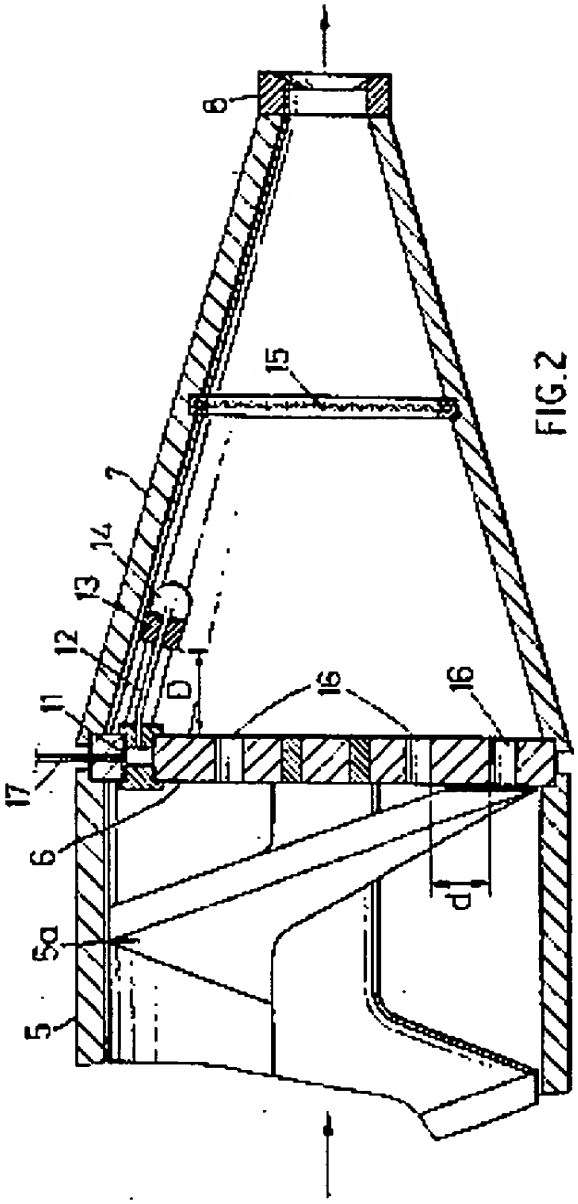

FIG.2

FIG.3

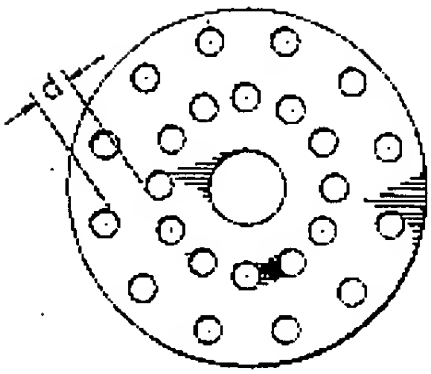

FIG.4

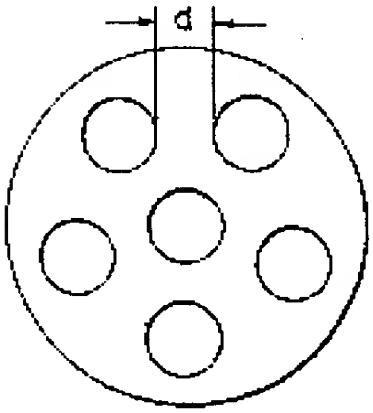

FIG.5